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PARK GUIDE 20

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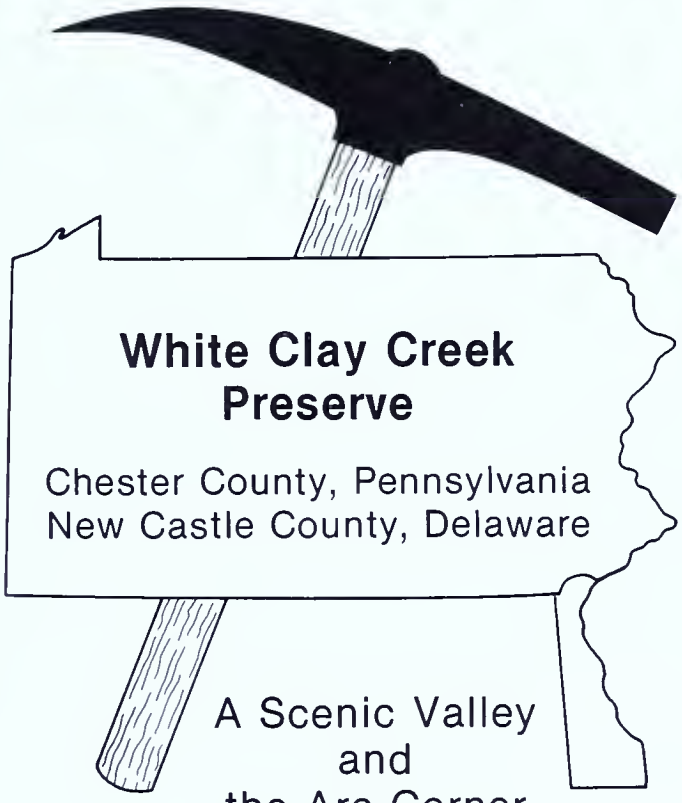

White Clay Creek Preserve

Chester County, Pennsylvania
New Castle County, Delaware

A Scenic Valley
and
the Arc Corner

Commonwealth of Pennsylvania
Department of Environmental Resources
Office of Parks and Forestry
Bureau of Topographic and Geologic Survey
and Bureau of State Parks

State of Delaware
Delaware Geological Survey
and Department of Natural Resources and
Environmental Control
Division of Parks and Recreation

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White Clay Creek Preserve,
Chester County,

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Drafted by James H. Dolimpio

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White Clay Creek Preserve

by
Rodger T. Faill
Pennsylvania Geological Survey

White Clay Creek forms a scenic valley incised in the rolling Piedmont terrain of southeastern Pennsylvania and northwestern Delaware. It has a long history, geological as well as cultural. The Lenape Indians, who lived in this valley before Europeans settled here, named the creek for the white clay deposits found in the area, which were formed by the weathering of the mineral feldspar. In the 1650's, Swedish settlers translated the Indian name to "Hwitlerskil." Later English inhabitants perpetuated the name, translating it to "White Clay Creek."

With the creation of the White Clay Creek Preserve, a joint venture of the states of Delaware and Pennsylvania, this portion of the valley became a two-state recreational area devoted to the quiet enjoyment of nature.

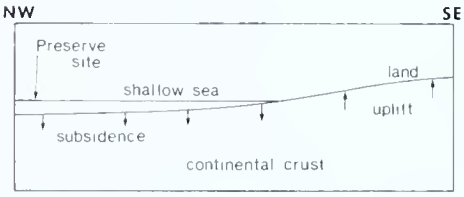
How to Use This Guide

* Turn to pages 6 and 7. The map pinpoints three geologic sites of interest within and near White Clay Creek Preserve. Drive to Sites B and C, and hike to Site A. The sites are described on pages 4 and 5.

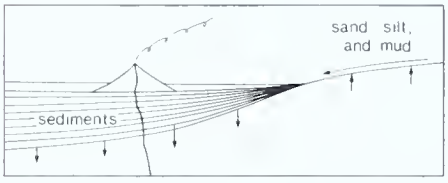
  Look for this symbol in the guide and at each site to match descriptions and locations.
* Pages 2 and 3 contain descriptions of how the rocks in White Clay Creek Preserve were formed.
* Turn to pages 8 and 9 to find out how the creek valley was carved out of the rocks and shaped to its present form.
* See pages 10 and 11 to read about the history of the White Clay Creek area.
* The origin of the Preserve is discussed on page 12.

Ancient Seas and Crushed Rocks

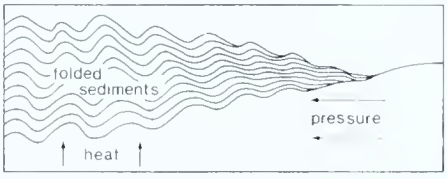
The White Clay Creek landscape has been flooded, folded, heated, and eroded, creating the scenery we see today.



Some 600 million years ago, the Preserve was part of a large continental area that subsided and was covered by a shallow sea.



Through time, sediment composed of sand, silt, and mud spread over the sea floor. At various intervals, volcanoes poured lava onto these deposits. Gradually the sediments hardened into sedimentary rocks.



About 460 million years ago, an immense mountain-building episode folded and heated the rocks and completely changed their character.

New Minerals from Old

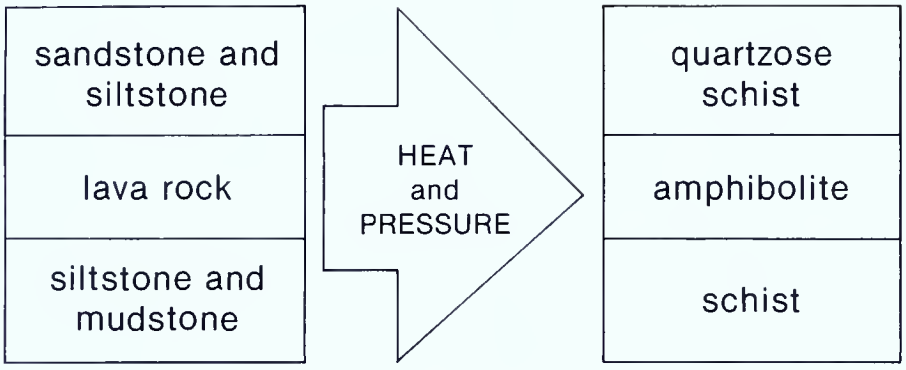
Minerals such as quartz, clay, and calcite are common in sediments because they are stable at the surface of the earth. But when they are heated and subjected to high pressure, they break down and form new minerals in a process called ***metamorphism.***

Clay changes into green chlorite or into flakes of clear muscovite and black biotite. Some quartz may combine with calcite and clay to form red garnets and dark amphiboles.

The rocks in the Preserve "cooked" at elevated temperatures and pressures for some 70 million years, long enough for the new minerals to develop.

Approximately 390 million years ago, the Preserve was uplifted and cooled, which halted the metamorphism. Since then, the minerals have remained largely unchanged.

How the Rocks Changed



The rocks in White Clay Creek Preserve are assigned to the Wissahickon Formation because they closely resemble the rocks along Wissahickon Creek in Philadelphia. These rocks are 400 to 600 million years old. Because of metamorphism, the Wissahickon Formation now consists of schists, quartzose schists, and amphibolite. The amphibolite probably constitutes less than 10 percent of the formation.

Mudstone and siltstone (containing much clay) became the medium-gray ***schist***, which is rich in flaky black mica (biotite). White grains of feldspar (with flat crystal faces) are common as well. Some clear, glassy quartz (with irregular surfaces) is present, commonly in small to medium lenses. Red garnets appear in some of the schists.

The sandstone initially contained more quartz and less mud, so it was changed into light-gray ***quartzose schist***. Biotite and feldspar are present, although not as plentiful as in the schist. Grains of quartz and quartz laminae are much more prevalent.

The lava flows became very dark gray ***amphibolites***. Nearly black hornblende dominates these rocks; interspersed feldspar grains tend to be medium gray to white.

Looking at the Rocks

Wissahickon Formation

The initial sediments were layered and laminated, and this layering has been preserved despite the metamorphism. The minerals quartz and feldspar are present all through the rock, but they dominate the light-colored layers. Black flakes of the mica biotite pervade the dark layers.

Where to See

Along Peltier Road, an easy walking trail on the west side of White Clay Creek, south of London Tract Church. Park in the lot about ¼ mile northeast of the church, along Sharpless Road. Walk about ¾ mile south to stream at Site A on the map.

Mica Schist

The outcrop on the north side of the stream exposes schist, consisting of alternating light and dark, thin layers that have been folded. The small reddish grains in some of these rocks are garnets.

Amphibolite

Amphibolite occurs south of the stream. This homogeneous dark rock contains thin white layers of quartz and feldspar introduced before the lava rock was metamorphosed. Initially straight, they were later folded.

Quartzose Schist

A few hundred yards farther south, the rocks are quartzose schist. These schists are coarse grained, and, because they contain more quartz than those to the north, they protrude from the valley side.

Pegmatites

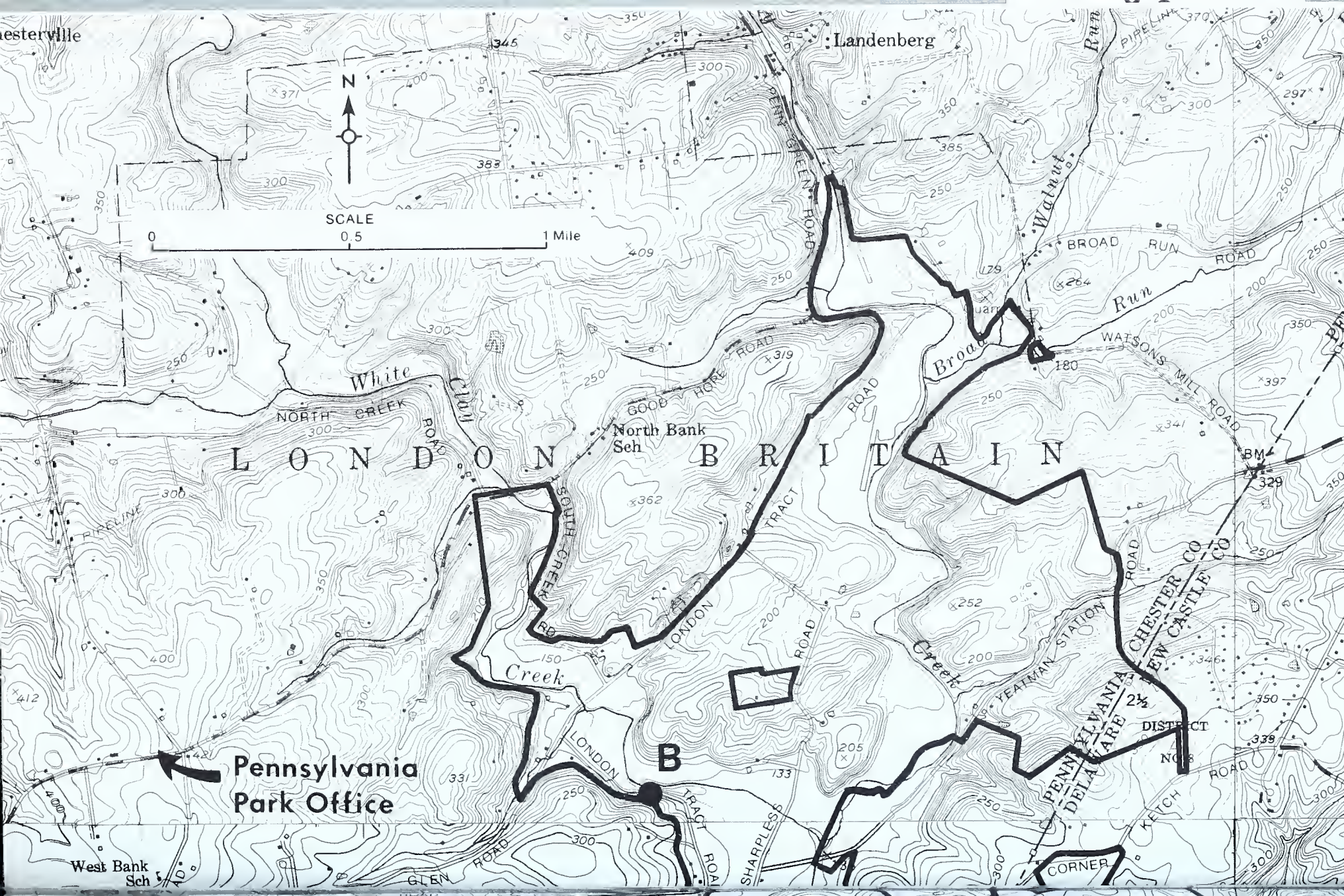
Hot fluids passed through various fractures in these rocks at some time following the metamorphism. The fluids deposited quartz and feldspars in tabular to irregular bodies up to 30 feet across, called pegmatites. The large crystals of feldspars include white orthoclase and albite, and white to salmon-colored microcline. In addition to quartz and the feldspar minerals, one can often find the white mica muscovite, the dark mica biotite, and tourmaline.

During the nineteenth century, numerous small mines were opened to obtain feldspar for the ceramic industry, but mining gradually ended in the early years of the twentieth century. This tough rock was also used to build low dams.

Where to See

Small mines—Along London Tract Road. Site B on the map.

Pegmatite dam—Across White Clay Creek, south of Hopkins Road, and seen from Tweeds Mill Road. Site C on the map.



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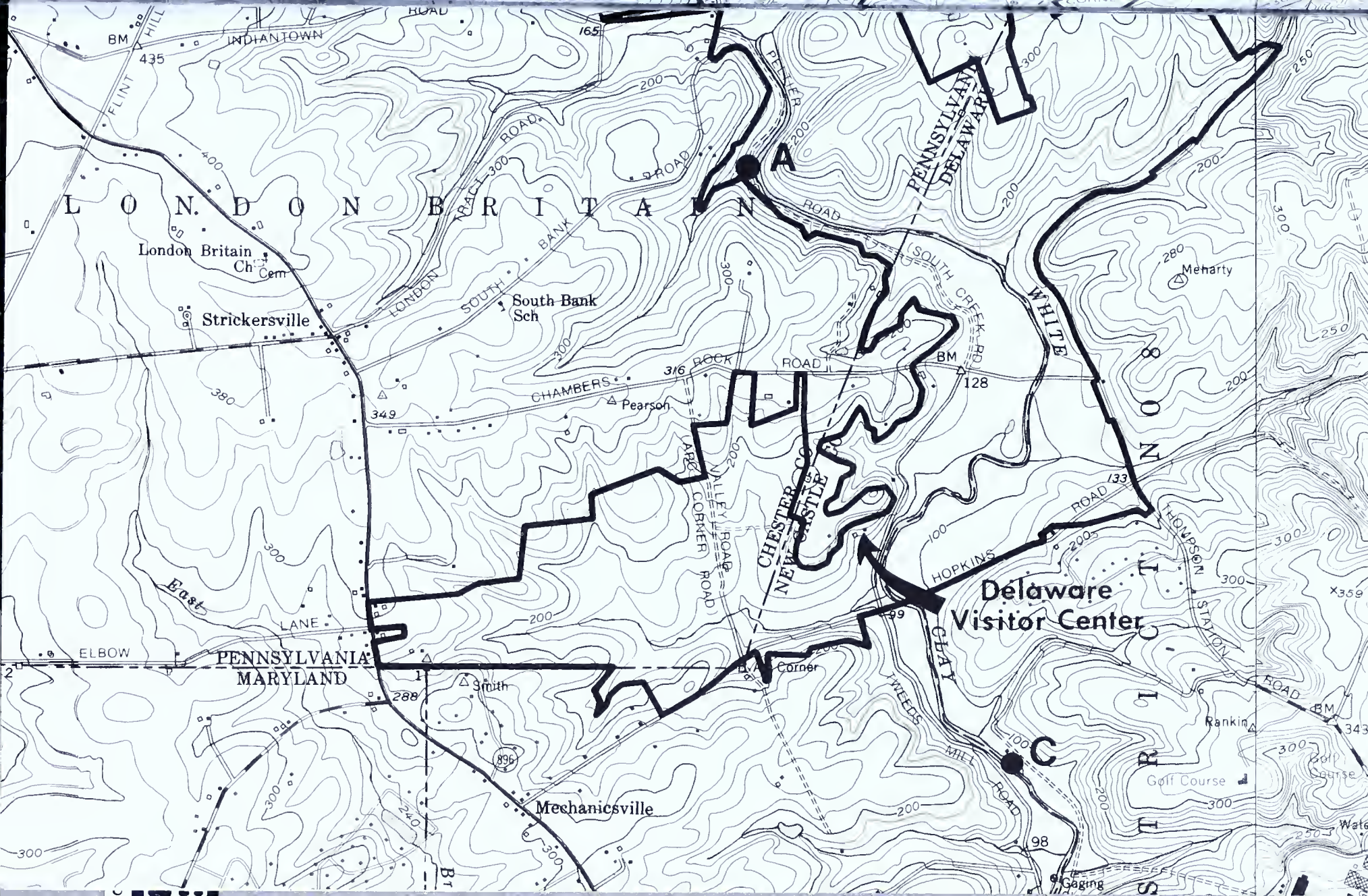
Pennsylvania Park Office



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ARC
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ROAD
VALLEY ROAD
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NEW CASTLE CO
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ROAD
HOPKINS
THOMPSON
STATION
ROAD
Delaware
Visitor Center
99
CLAY
East
LANE
ELBOW
PENNSYLVANIA
MARYLAND
Smith
288
Corner
TWEEDS
MILL
ROAD
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Rankin
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Golf Course
Golf
Course
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Mechanicsville
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Gaging

Carving a Valley

Slicing Through Rock

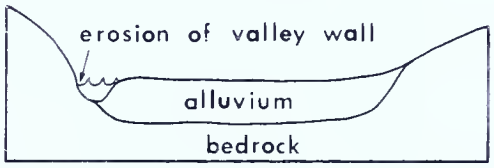
The White Clay Creek valley floor is very flat, and is bounded by steep valley-side slopes along much of its length. The creek is not very large—in most places, it is not even 10 yards wide, and, in some spots, it is shallow enough to wade across. One wonders how such a small stream could carve such a large valley in solid rock. Originally, this valley was filled with rocks as high and solid as those in the surrounding hills. At some time, the sea level fell or the land was uplifted, and the ancestral White Clay Creek began to cut downward through the rocks, forming a narrow valley. But a creek can erode downward only so far—it cannot go lower than the river into which it flows. So it must eventually start cutting sideways, first against one valley slope, then the other, gradually widening the valley floor.

Widening the Valley

Evidence of lateral migration is easy to find. Where the creek butts against a valley side, it commonly erodes the steep slope and exposes rock. The valley slope on the opposite side is more gentle and has a thick soil cover that has not been disturbed by the creek for a long time.

The White Clay Creek valley is not uniformly wide. It is quite narrow along Peltier Road in Pennsylvania (see Site A on the map), and thus its floodplain is small. To the north and south, the valley widens in a number of places. Contrast in the underlying bedrock probably explains some of this variation. The quartzose schists are more resistant to erosion, and thus yield less to the action of the creek. The rocks to the north and south of this location generally contain less quartz, and the valley tends to be wider in those areas.

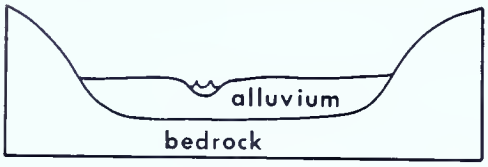
VALLEY WIDENING



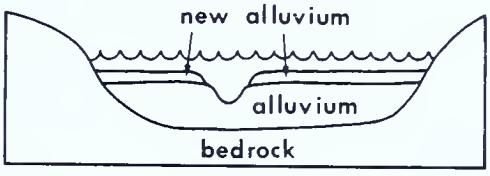
Smoothing the Valley Floor

Rock outcrops are rare in the valley. Most of the valley floor is a floodplain underlain by ***alluvium***, a mixture of sand, mud, and a few boulders or cobbles. Bedrock is deeper, carved out at some time in the past, possibly when the stream was much larger. The creek gradually moves this material downstream, especially during floods, when the water spreads over the entire valley floor. As the floodwater recedes, the mud and sand that was carried by the water is deposited uniformly across the floodplain, leaving behind a flat valley floor.

NORMAL STREAMFLOW



FLOODED STREAM



Early Days in the White Clay Creek Valley

Native American groups have lived in the White Clay Creek valley for some 12,000 years. They settled on the higher knolls of the floodplain to hunt, fish, and gather plants for food, medicines, dyes, and fibers. Smaller groups moved into the adjacent uplands to hunt or to make projectile points and other tools from the milky quartz found there. Later groups may have encouraged the growth of wild plant foods, such as amaranth, or even planted domesticated crops, such as squash and beans.

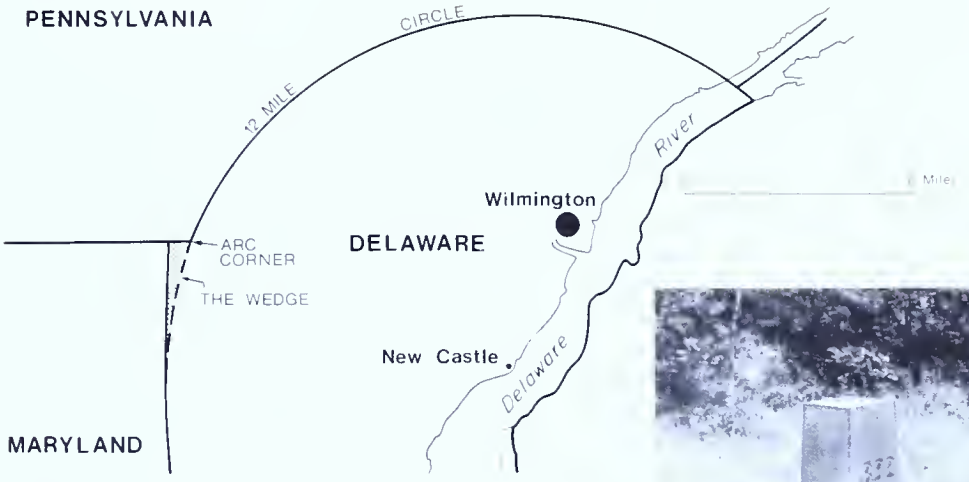
When the first European farmers settled here late in the seventeenth century, they cleared the oak/hickory forests in order to plant wheat and corn or to develop meadows for cattle. The first farmsteads were probably on the floodplain, where the most fertile soils were located. The first houses and barns were built from the logs produced by land clearing. As the population grew, newer structures were built into the sides of steep slopes or on other parts of the farms that were not suitable for crops. Local stone from outcrops of the Wissahickon Formation was commonly used.

White Clay Creek and its tributaries provided water power to saw wood and to grind flour or meal. A number of mills were in operation through the 1700's and the early part of the 1800's. But, by the end of the nineteenth century, most of the smaller custom mills had been closed.

The predominantly rural character of the area continued through the first half of the twentieth century. Even the construction of the Avondale, Newark, and Delaware City Railroad (locally known as the Pomeroy Railroad) had little effect. Following World War II, however, suburban communities began to appear in the area. The establishment of White Clay Creek Preserve ensures that portions of the natural environment will survive for future generations to enjoy.

The Delaware park office.

The Wedge



The circular boundary between Delaware and Pennsylvania was created in 1681 when King Charles II of England granted William Penn the land northeast, north, and northwest of a 12-mile-radius circle centered on the town of New Castle and bounded on the east by the Delaware River. When the exact boundaries of Maryland, Delaware, and Pennsylvania were later established, the intersection of the boundaries was supposed to lie on the 12-Mile Circle. But the surveyors in the 1700's had made errors in measuring the radius, and a resurvey in the mid-1800's showed that the circle actually met the Delaware-Maryland boundary a few miles south of the Pennsylvania-Maryland boundary. This meant that a triangle of land, which became known as the Wedge, lay between Maryland's eastern border and Delaware's northern circle. Technically, this area of roughly 800 acres was part of Pennsylvania.

The Arc Corner monument at the intersection of Hopkins Road and Arc Corner Road.

During Colonial times and into the 1800's, however, the Wedge was considered part of Delaware, and, even after the surveying errors were discovered, the people living in the Wedge continued to vote and pay taxes in Delaware. In the 1890's, Pennsylvania agreed to extend its southern boundary eastward to the 12-Mile Circle (at the Arc Corner), and, in 1921, the Wedge officially became part of Delaware.

The Beginning of White Clay Creek Preserve

The E. I. duPont de Nemours and Company and the Delaware Water Company began acquiring property in the White Clay Creek valley in the 1950's. At that time, there was some concern that existing water sources would be inadequate to meet future needs. Plans were made for the Du Pont Company to establish a reservoir with a surface area of as much as 1,000 acres. However, a variety of conservation and other citizens' groups began to organize opposition to these plans, and the possibility of preserving the White Clay Creek valley in its natural state gathered support.

When it became clear in the early 1980's that construction of the reservoir was not likely to be approved, the Du Pont Company asked the National Park Service to submit conservation strategies for the White Clay Creek properties. The Park Service recommended that the land be placed in public ownership. Because Du Pont had acquired holdings in both Delaware and Pennsylvania, a jointly managed, bi-state park was proposed.

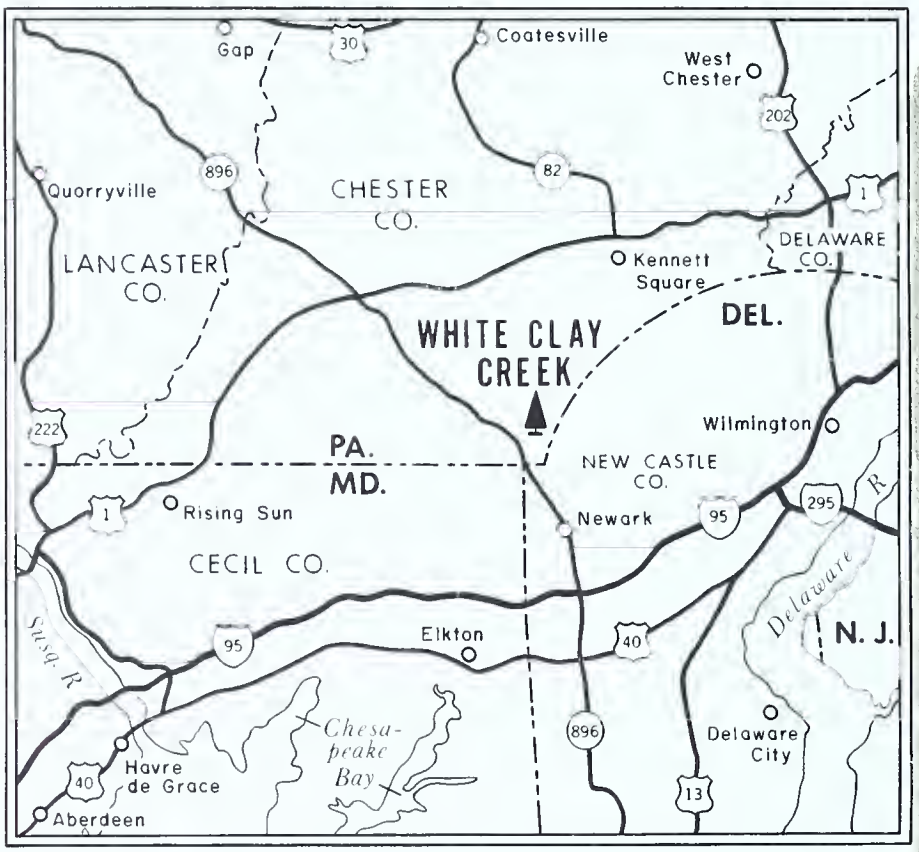
The title was formally transferred in 1984 from the Du Pont Company to the two states in a symbolic ceremony based on the "livery and seisin" ceremony by which local officials who had served under the Duke of York transferred the symbols of property rights to William Penn. The management of the Preserve is coordinated by a bi-state advisory council, and low-intensity activities, such as hiking, are emphasized with the intention to stress the natural environment as little as possible.

For More Information, Contact:

Park Superintendent
White Clay Creek Preserve
Box 172
Landenberg, PA 19350
215-255-5415

-or-

Park Superintendent
White Clay Creek Preserve
425 Wedgewood Road
Newark, DE 19711
302-731-1310



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